

**What is claimed is:**

1. A communications system used in a network where a plurality of communication nodes are connected,  
5 comprising:
  - a digital wrapper unit, which is provided in each of the plurality of communication nodes, transmitting/receiving a digital wrapper frame;
  - a converting unit, which is provided in each of  
10 first and second communication nodes among the plurality of communication nodes, performing mutual conversion between data in a predetermined format and a digital wrapper frame; and
  - a network management unit managing states of the  
15 plurality of communication nodes, wherein
    - said digital wrapper unit transmits to the second communication node a digital wrapper frame obtained by said converting unit in the first communication node in accordance with an instruction from said network  
20 management unit, and
    - said converting unit, which is provided in the second communication node, converts the received digital wrapper frame into the data in the predetermined format.

2. The communications system according to claim 1, wherein

said network management unit comprises

a first storing unit storing topology  
5 information that represents a connection relationship  
among the plurality of communication nodes,

a second storing unit storing route  
information that represents a communication route  
connecting the first communication node and the second  
10 communication node, and

a controlling unit giving an instruction to  
a communication node involved in the communication route  
based on the topology information and the route  
information.

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3. The communications system according to claim 2, further comprising

a route determining unit determining a  
communication route connecting the first communication  
20 node and the second communication node by referencing  
the topology information and previously stored route  
information, and writing route information  
corresponding to the newly determined communication  
route to said second storing unit.

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4. The communications system according to claim 2, wherein:

said network management unit further comprises  
a fault detecting unit detecting a location  
5 where a fault occurs on the network, and  
an updating unit updating the route  
information stored in said second storing unit according  
to the location where the fault occurs, which is detected  
by said fault detecting unit; and  
10 said controlling unit gives an instruction to a  
corresponding communication node based on the route  
information updated by said updating unit.

5. The communications system according to claim 2, wherein:

said network management unit manages information  
for using communication resources of respective lines  
between the plurality of communication nodes as first  
and second paths; and  
20 said controlling unit gives to a corresponding  
communication node an instruction for setting up the  
communication route by using the first path if a fault  
is not detected on the network, and gives to a  
corresponding communication node an instruction for  
25 setting up a bypass route by using the second path

according to a location where a fault occurs if the fault is detected on the network.

6. The communications system according to  
5 claim 2, wherein:

said network management unit further comprises  
a determining unit determining whether or  
not to set up a bypass route according to a type of a  
signal transmitted via a communication route when a  
10 fault occurs on the communication route connecting the  
first communication node and the second communication  
node, and

an updating unit updating the route  
information stored in said second storing unit if said  
15 determining unit determines to set up a bypass route;  
and

said controlling unit gives an instruction to a  
corresponding communication node based on the updated  
route information when the route information is updated  
20 by said updating unit.

7. The communications system according to  
claim 6, wherein

said determining unit determines not to set up a  
25 bypass route if a communication route on which a fault

occurs is an SDH network or a SONET network.

8. The communications system according to claim 6, wherein

5 said determining unit determines to set up a bypass route if a communication route on which a fault occurs is an Ethernet system.

9. The communications system according to claim 1, wherein:

a line between the plurality of communication nodes is a WDM transmission line; and

each of the plurality of communication nodes further comprises a multiplexing unit transmitting  
15 digital wrapper frames that store different data in parallel.

10. The communications system according to claim 9, wherein

20 each of the plurality of communication nodes further comprises an equalizing unit equalizing a WDM signal.

11. The communications system according to claim 10, wherein  
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said equalizing unit is a variable optical attenuator attenuating WDM light, and a controlling circuit controlling the variable optical attenuator.

5           12. The communications system according to claim 10, wherein

said equalizing unit is an optical amplifier amplifying WDM light, and a controlling circuit controlling the optical amplifier.

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13. A communication device as one of a plurality of communication devices, which is used in a network where the plurality of communication devices are connected, comprising:

15           first, second, and third optical splitters respectively splitting optical signals that are respectively received via first, second, and third optical input lines;

20           a first optical switch selecting one of the optical signals output from said second optical splitter and said third optical splitter, and guiding the selected optical signal to a first optical output line;

25           a second optical switch selecting one of the optical signals output from said first optical splitter and said third optical splitter, and guiding the

selected optical signal to a second optical output line;

a third optical switch selecting one of the optical signals output from said first optical splitter and said second optical splitter, and guiding the

5 selected optical signal to a third optical output line;

a processing unit processing an overhead of a digital wrapper frame that is transmitted via the first optical input line and the first optical output line; and

10 a controlling unit controlling said first, second and third optical switches in accordance with an instruction for setting up a communication route via the plurality of communication devices.

15 14. The communication device according to claim 13, further comprising:

a unit storing data, which is received via the second or the third optical input line, in a payload of a digital wrapper frame, and guiding the frame to  
20 said processing unit; and

a unit extracting data from a payload of a digital wrapper frame terminated by said processing unit, and guiding the data to the second or the third optical output line.

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15. A network management device managing a network where a plurality of communication nodes are connected, comprising:

5 a first storing unit storing topology information that represents a connection relationship among the plurality of communication nodes;

a second storing unit storing route information that represents a communication route connecting first and second communication nodes among the plurality of  
10 communication nodes, each of the first and second communication nodes comprising a converting unit performing mutual conversion between data in a predetermined format and a digital wrapper frame; and

a controlling unit giving an instruction for  
15 transmitting a digital wrapper frame to a communication node involved in the communication route based on the topology information and the route information.

16. The network management device according to  
20 claim 15, further comprising:

a fault detecting unit detecting a location where a fault occurs on the network; and

an updating unit updating the route information stored in said second storing unit according to the  
25 location where the fault occurs, which is detected by



said fault detecting unit, wherein

said controlling unit gives an instruction to a corresponding communication node based on the route information updated by said updating unit.